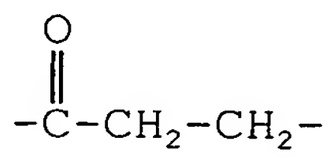
CLAIMS

1. A polyketone comprising repeating units, 95-100 mole% of which are 1-oxotrimethylene represented by formula (1) and having an intrinsic viscosity of 2.5-20 dl/g, wherein the content of Pd element is 0-20 ppm, terminal structures include an alkyl ester group (terminal group A) represented by the formula (2) and an alkyl ketone group (terminal group B) represented by formula (3), and the equivalent ratio of terminal group A/terminal group B is 0.1-8.0:



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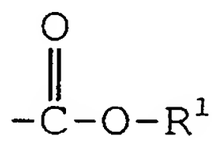

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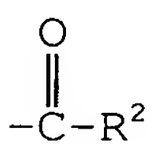


(3)

(wherein R^1 is hydrocarbon of 1-6 carbon atoms and R^2 is an organic group of 1-10 carbon atoms).

2. A polyketone according to claim 1, wherein the intrinsic viscosity is 4.0-8.0 dl/g, the equivalent ratio of terminal group A/terminal group B is 0.5-3.0, and the content of Pd element is 0-10 ppm.

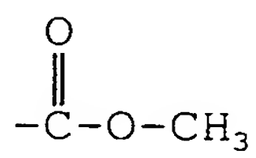
3. A polyketone according to claim 1 or 2, wherein the content of carboxylic acid terminal group is 0-10 milli-equivalent/kg.

4. A polyketone according to any one of claims

1-3, which has a DSC melting point Tm^3 of 230°C or higher.

5. A polyketone according to any one of claims 1-4, which has a DSC melting point Tm^3 of 240°C or higher.

6. A polyketone according to any one of claims 1-5, wherein the terminal group A is a methyl ester group represented by the following formula (4), the terminal group B is an ethyl ketone group represented by the following formula (5), and the equivalent ratio of terminal group A/terminal group B is 1.0-8.0:



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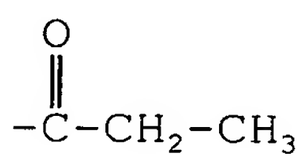
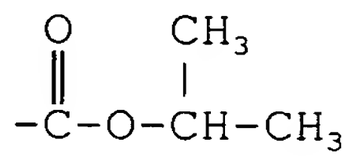


(5)

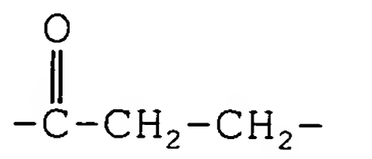
7. A polyketone according to any one of claims 1-5, wherein the terminal group A is an isopropyl ester group represented by the formula (6), the terminal group B is an ethyl ketone group represented by the formula (5), and the equivalent ratio of terminal group A/terminal group B is 0.5-2.5:



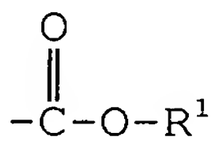
(6)

8. A polyketone according to any one of claims 1-7, wherein when the polyketone is dissolved in

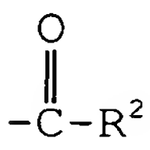
2.5-20 dl/g, wherein the content of Pd element is 0-20 ppm and the terminal structures include an alkyl ester group (terminal group A) represented by the formula (2) and an alkyl ketone group (terminal group B) represented by the formula (3), and the equivalent ratio of terminal group A/terminal group B is 0.1-8.0:



$$-C-CH_2-CH_2- \qquad (1)$$



$$-C-O-R^1 \qquad (2)$$



$$-C-R^2 \qquad (3)$$

(wherein R^1 is hydrocarbon of 1-6 carbon atoms and R^2 is an organic group of 1-10 carbon atoms).

11. A tire cord comprising at least 50 wt% of the polyketone fiber according to claim 10.

12. A polyketone article, characterized in that the polyketone molded product according to claim 9 or the polyketone fiber according to claim 10 is at least partly used in the article.

13. A polyketone article according to claim 12 which is a tire, a belt or a constructional material.

14. A fiber-reinforced composite material comprising at least 1 wt% of the polyketone fiber according to claim 10 with respect to the whole fibers.

15. A method for producing a polyketone having an

intrinsic viscosity of 2.5-20 dl/g by copolymerizing carbon monoxide and an ethylenically unsaturated compound, wherein the copolymerization is carried out in the presence of a metal complex catalyst obtained by reacting the following compounds (a)-(c), in the following liquid medium (d), and under the following conditions (e):

(a) a palladium compound,

(b) a bidentate ligand having an atom of Group 15 elements,

(c) an acid having a pKa of 4 or less,

(d) a liquid medium containing an alcohol of 1-6 carbon atoms and water and having a water content, as represented by the following Expression 1, of 10-500,000 ppm,

(e) a polymerization pressure P of 5 MPa or higher and a polymerization temperature T of 50-200°C,

$$\text{Water content (ppm)} = \frac{\text{Mass of water (g)}}{\text{Volume of polymerization solvent other than water (ml)} + \text{Volume of water (ml)}} \times 10^6$$

(the volumes in the denominator of the right side are values at 25°C).

16. A method for producing a polyketone according to claim 15, wherein the polymerization temperature is 70-200°C and the polymerization pressure is 7 MPa or higher.

17. A method for producing a polyketone according

to claim 15 or 16, wherein (a) is at least one palladium compound selected from the group consisting of palladium acetate, palladium trifluoroacetate, palladium acetylacetonate and palladium chloride;

(b) is at least one phosphorus bidentate ligand selected from the group consisting of 1,3-bis{di(2-methoxyphenyl)phosphino}propane, 1,3-bis(diphenylphosphino)propane, 1,2-bis[{di(2-methoxyphenyl)phosphino}methyl]benzene and 1,3-bis{di(2-methoxy-4-sodium sulfonate-phenyl)phosphino}propane;

(c) is at least one acid selected from the group consisting of sulfuric acid, methanesulfonic acid, trifluoromethanesulfonic acid and trifluoroacetic acid; and

(d) is a solvent containing at least one alcohol selected from the group consisting of methanol, ethanol, n-propanol and isopropanol.

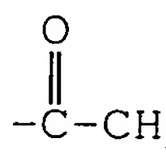
18. A method for producing a polyketone according to any one of claims 15-17, wherein the copolymerization is carried out in the presence of benzoquinone or naphthoquinone.

19. A method for producing a polyketone according to any one of claims 15-18, wherein the molar ratio of ethylenically unsaturated compound/carbon monoxide in the reaction vessel is 1/1-5/1.

20. A method for producing a polyketone according to any one of claims 15-19, wherein the amount of the

hexafluoroisopropanol at a concentration of 0.1 wt% and ultraviolet spectrum of the solution is measured in a quarts cell at a scanning speed of 200 nm/min and a data intake interval of 0.5 nm, the minimum value of absorbance observed at a wavelength of 200-250 nm is 0.14 or less.

9. A polyketone molded product having repeating units, 95-100 mol% of which are 1-oxotrimethylene represented by the formula (1) and having an intrinsic viscosity of 2.5-20 dl/g, wherein the content of Pd element is 0-20 ppm and terminal structures include an alkyl ester group (terminal group A) represented by the formula (2) and an alkyl ketone group (terminal group B) represented by the formula (3), and the equivalent ratio of terminal group A/terminal group B is 0.1-8.0:



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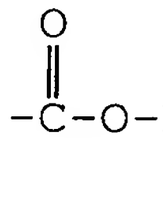

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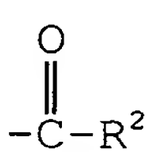

(3)

(wherein R^1 is hydrocarbon of 1-6 carbon atoms and R^2 is an organic group of 1-10 carbon atoms).

10. A polyketone fiber having repeating units, 95-100 mol% of which are 1-oxotrimethylene represented by the formula (1) and having an intrinsic viscosity of

palladium compound used is 0.01-10,000 micromoles per 1 liter of the polymerization solvent, and the amount of the bidentate ligand having an atom of Group 15 elements and the amount of the acid having a pKa of 4 or less are 0.1-10 moles and 0.1-10,000 moles, respectively, based on 1 mole of the palladium compound.

21. A method for producing a polyketone according to any one of claims 15-20, wherein the content of the alcohol of 1-6 carbon atoms in the liquid medium (d) is 75 vol% or more.

22. A method for producing a polyketone according to any one of claims 15-21, wherein the acid having a pKa of 4 or less is sulfuric acid and the polymerization solvent contains an alcohol of 1-6 carbon atoms and water, the water content being 10-500,000 ppm.

23. A method for producing a polyketone according to any one of claims 15-22, wherein the polymerization pressure P (MPa) and the polymerization temperature T (°C) satisfy both of the following Expressions 2 and 3:

$$\text{Expression 2: } P \geqq 720 \times \exp(-0.0629 \times T)$$

$$\text{Expression 3: } P \geqq 0.0179 \times \exp(0.0607 \times T).$$

24. A method for producing a polyketone having an intrinsic viscosity of 3.0-20 dl/g by copolymerizing carbon monoxide and an ethylenically unsaturated compound, wherein the polymerization activity is 10

kg/g-Pd·hr or higher.

25. A method for producing a polyketone having an intrinsic viscosity of 2.5-20 dl/g by copolymerizing carbon monoxide and an ethylenically unsaturated compound, wherein the polymerization activity is 20 kg/g-Pd·hr or higher and the catalyst efficiency (kg/g-Pd) expressed by the product of the polymerization activity and the polymerization time (hr) is 50 or higher.